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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **Hosur et al.**

Docket: **TI-28734**

Serial No.: **09/224,401**

Examiner: **H. Nguyen**

Filed: **December 31, 1998**

Art Unit: **2662**

For: **POWER CONTROL WITH SPACE TIME TRANSMIT DIVERSITY**

APPELLANTS' BRIEF

July 25, 2001

MAILING CERTIFICATE UNDER 37 C.F.R. §1.8(A)
I hereby certify that the above correspondence is being deposited with the U.S. Postal Service as First Class Mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on July 25, 2001.

Jackie McBride
Jackie McBride

Comm. of Patents and Trademarks

Washington, D.C. 20231

Dear Sir:

In support of their appeal of the Final Rejection of claims in the above-referenced application, appellants respectfully submit herein their brief.

1. REAL PARTY IN INTEREST

Texas Instruments Incorporated is the real party in interest.

2. RELATED APPEALS AND INTERFERENCES

No other related appeals or interferences are known to appellants.

3. STATUS OF CLAIMS

Claims 1-45 are in the application. Claims 1-28 are rejected under 35 U.S.C. § 103(a). Claims 29-45 are allowed. Examiner in an Office Action of March 26, 2001 made final rejection of claims 1-28. Claims 1-28 are on appeal and are reproduced in the Appendix to Appellants' Brief filed herewith.

4. STATUS OF AMENDMENTS

Claims 1-28 were filed in their present form on December 31, 1998, with the instant application. Appellants filed a response under 37 C.F.R. § 1.112 on May 15, 2001, requesting reconsideration in response to the final rejection on March 26, 2001. In an Advisory Action of June 13, 2001, Examiner stated that the request for reconsideration does not place the application in a condition for allowance.

5. SUMMARY OF INVENTION

The invention of claims 1-16 is directed to an exemplary circuit (FIG. 4), comprising a measurement circuit (432)(page 9, line 24-page 10, line 3). The measurement circuit receives a first input signal 903 (FIG. 9A, page 10, lines 8-12) from a first antenna A1 (FIG. 1, 128) of a transmitter and a second input signal 913 (FIG. 9A, page 10, lines 8-12) from a second antenna A2 (FIG. 1, 130) of the transmitter. Each of the first and second input signals are transmitted at a first time t_m. The measurement circuit produces an output signal (FIG. 4, page 10, lines 1-4 and 13-14) corresponding to a magnitude of the first and second input signals. A control circuit 430 (FIG. 4, page 10, lines 3-4 and 12-14) receives the output signal and a reference signal (FIG. 4, target SIR). The control circuit produces a control signal (FIG. 9A, page 10, lines 13-17) at a second time t_s in response to a comparison of the output signal and the reference signal.

The invention of claims 17-21 is directed to an exemplary circuit (FIG. 4), comprising a measurement circuit (432)(page 9, line 24-page 10, line 3). The measurement circuit receives a first

input signal 933 (FIG. 9B, page 10, line 28-page 11, line 1) from a first antenna A1 (FIG. 1, 128) of a transmitter at a first time t_{m1} and a second input signal 944 (FIG. 9B, page 11, lines 3-6) from a second antenna A2 (FIG. 1, 130) of the transmitter at a third time t_{m2}. The measurement circuit produces a first output signal (FIG. 4, page 10, line 29-page 11, line 1) corresponding to a magnitude of the first input signal and a second output signal (FIG. 4, page 11, lines 3-6) corresponding to a magnitude of the second input signal. A control circuit 430 (FIG. 4, page 10, lines 3-4 and 12-14) receives the output signals and a reference signal (FIG. 4, target SIR). The control circuit produces a first control signal 934 (FIG. 9B, page 11, lines 2-3) at a second time t_{s1} in response to a comparison of the first output signal and the reference signal. The control circuit produces a second control signal 945 (FIG. 9B, page 11, lines 6-7) at a fourth time t_{s2} in response to a comparison of the second output signal and the reference signal.

The invention of claims 22-24 is directed to a method of processing signals similar to that performed by the exemplary circuit of FIG. 4 with respect to claims 1-16.

The invention of claims 25-28 is directed to a method of processing signals similar to that performed by the exemplary circuit of FIG. 1, comprising the steps of receiving at least one control signal TPC (FIG. 1 and FIG. 9A, page 10, lines 13-17) from an external source (FIG. 4, page 9, lines 11-22) at a first time t_s; producing a transmit power level TPC of each of a plurality of antennas 128 and 130 (FIG. 1, page 6, lines 9-10) in response to the control signal; transmitting a plurality of signals (FIG. 9A, 903 and 913) to the external source at a respective said transmit power level at a second time t_m from a respective said plurality of antennas.

6. ISSUES

A. Whether Gilhousen et al. (U.S. Patent No. 5,056,109) combined with Sousa et al. (U.S. Patent No. 5,832,044) teach or suggest all limitations of claims 1-28.

B. Whether there is a reasonable expectation that Gilhousen et al. combined with Sousa et al. would succeed in producing the invention of claims 1-28.

C. Whether the prior art provides motivation to combine Gilhousen et al. with Sousa et al. to produce the invention of claims 1-28.

7. GROUPING OF CLAIMS

Claims 1-16 stand separately as directed to the exemplary embodiment of FIG. 9A.

Claims 17-21 stand separately as directed to the exemplary embodiment of FIG. 9B.

Claims 22-24 stand separately as a method of processing signals for exemplary embodiments of FIG. 9A and FIG. 9C.

Claims 25-28 stand separately as a method of processing signals for the exemplary embodiment of FIG. 1.

8. ARGUMENT

Examiner has rejected claims 1-28 under 35 U.S.C. § 103(a) as being unpatentable over Gilhousen et al. (U.S. Pat. No. 5,056,109) in view of Sousa et al. (U.S. Pat. No. 5,832,044). A *prima facie* case of obviousness requires three things. First there must be some suggestion or motivation to combine the teaching of Gilhousen et al. with Sousa et al. to produce the claimed invention. Second, there must be a reasonable expectation of success of the resulting combination. Third, the combined references must teach or suggest all the claim limitations. MPEP 706.02(j). For the following reasons, the cited references miss all three points. Thus, appellants respectfully submit that claims 1-28 are allowable under 35 U.S.C. § 103(a).

A. Failure to teach or suggest all claim limitations

Examiner states that Sousa et al. disclose antenna diversity with simultaneous transmission of data modulated signals over a set of L different antennas. (paper no. 8, page 10). Claim 1 recites

"a measurement circuit coupled to receive a first input signal from a first antenna of a transmitter and coupled to receive a second input signal from a second antenna of the transmitter . . . the measurement circuit producing *an output signal corresponding to a magnitude of the first and second input signals*." Claim 17 recites "a measurement circuit . . . producing *a first output signal corresponding to a magnitude of the first input signal and producing a second output signal corresponding to a magnitude of the second input signal*; and a control circuit coupled to receive *the first and second output signals and a reference signal*." Claim 22 recites "receiving *a plurality of input signals . . . measuring each input signal* of the plurality of input signals and producing at least one output signal." Claim 25 recites "producing *a transmit power level of each of a plurality of antennas* in response to the control signal." (emphasis added).

Gilhousen et al. are silent on diversity. Gilhousen et al. fail to teach or suggest plural antennas at either a base or mobile station. Sousa et al. only teach "Time Interleaving" combined with "Power Control." Furthermore, Sousa et al. explicitly teach that "the transmitter uses a single antenna and a single carrier frequency" for Time Interleaving and Power Control. (Channel Model 3, col. 14, lines 7-10 and col. 18, lines 29-32). Neither Gilhousen et al. nor Sousa et al. teach or suggest the above limitations as required by claims 1, 17, 22, or 25. Thus, a combination of Gilhousen et al. and Sousa et al. fail to teach or suggest all the claim limitations.

If, as examiner suggests, one of ordinary skill in the art combined "the fading resistance transmission as disclosed by Sousa et al. with the power control system using CDMA method as disclosed by Gilhousen et al." one would have "Time Interleaving and Power Control" as disclosed by Sousa et al. (col. 14, lines 7-29). Therein, Sousa et al. explicitly teach that "the transmitter uses a single antenna and a single carrier frequency" for Time Interleaving and Power Control. (Channel Model 3, col. 14, lines 7-10 and col. 18, lines 29-32). This time diversity is the only power control method taught or suggested by Sousa et al. Appellants believe it is the same power control method disclosed in admitted prior art Figure 8 (page 4, lines 1-11) of the instant specification.

To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner

must present a convincing line of reasoning as to why the artisan would have found the claimed invention to be obvious in light of the teachings of the references. Here, there is no teaching or suggestion to produce "an output signal corresponding to a magnitude of the first and second input signals" as required by claim 1 or other claim limitations. Examiner's *ipse dixit* does not reach a convincing line of reasoning. Moreover, examiner may not use improper hindsight to argue obviousness in view of appellants' disclosure. Thus, claims 1-28 are patentable under 35 U.S.C. § 103(a).

B. No reasonable expectation of success of the resulting combination

The consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that this process should be carried out and would have a *reasonable likelihood of success*, viewed in the light of the prior art. *Hodosh v. Block Drug Co.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir.), *cert. denied*, 479 U.S. 827 (1986)(*emphasis added*). The teaching or suggestion to make the claimed combination and the *reasonable expectation of success* must both be found in the prior art, not in the applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)(*emphasis added*). Here, there can be no reasonable expectation of success. Neither reference suggests a problem that would motivate a skilled artisan to combine or modify either reference. No combination of Gilhousen et al. with Sousa et al. produces the claimed invention. Examiner has not suggested how Gilhousen et al. might be combined with Sousa et al. or what additional circuitry might be necessary to produce the invention of claims 1-28. Thus, claims 1-28 are patentable under 35 U.S.C. § 103(a).

C. No suggestion to combine cited references to produce present invention

It is essential that Office personnel find some motivation or suggestion to make the claimed invention in light of the prior art teachings. See e.g., *In re Brouwer*, 77 F.3d 422, 425, 37 USPQ2d 1663, 1666 (Fed. Cir. 1996)("[T]he mere possibility that one of the esters or the active methyl group--containing compounds . . . could be modified or replaced such that its use would lead to the specific sulfoakated resin recited in claim 8 does not make the process in claim 8 obvious 'unless

the prior art suggested the desirability of [such a] modification' or replacement.")(quoting *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984); *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991)("[A] proper analysis under § 103 requires, *inter alia*, consideration of . . . whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process."). Here, there is no suggestion to combine references in either cited reference. Both Gilhousen et al. and Sousa et al. disclose their own respective power control methods. There is no indication that the power control method of either reference is compatible with the other.

Moreover, Sousa et al. specifically teach away from power control of the present invention. Sousa et al. teach that "as a result of the required system overhead to transmit power control bits there will always be (residual) variations in the received power level from frame to frame regardless of the rate of power control adjustments. . . . This variation in power level is similar to the variations that arise due to fading and as in the case of diversity discussed above a spectrally efficient coding scheme (signal constellation) is required to mitigate the effect of these power variations and consequently reduce the probability of error in the channel." (col 2, lines 55-67). Sousa et al., therefore, teach that a spectrally efficient coding scheme at the transmitter is *required to mitigate the effect of power variations*. Alternatively, the present invention advantageously balances power across multiple antennas. (page 5, lines 2-3). One of ordinary skill in the art would not think to combine Sousa et al. with Gilhousen et al. to produce the claimed invention. This would preclude the required spectrally efficient coding scheme. Furthermore, even a combination of Sousa et al. with Gilhousen et al. would not produce advantages of the claimed invention.

Examiner argues that "it would have been obvious to one of ordinary skill in the art to combine the fading resistance transmission as disclosed by Sousa et al. with the power control system using CDMA method as disclosed by Gilhousen et al. to arrive at the claimed invention in order *not to provide any additional power or bandwidth and to balance the power across multiples [sic] antennas*." (emphasis added)(paper no. 11, page 3, lines 16-20). Examiner offers these advantages as motivation to combine Sousa et al. with Gilhousen et al. These advantages, however,

are borrowed from the instant specification. (page 5, lines 1-3). They are not found in the prior art. Thus, claims 1-28 are patentable under 35 U.S.C. § 103(a).

In summary, **Examiner has erred** in concluding that a combination of Gilhousen et al. and Sousa et al. teach all the claimed elements. **Examiner has erred** in concluding that a combination of Gilhousen et al. and Sousa et al. would successfully produce the claimed invention. **Examiner has erred** in concluding that either reference suggests a combining Gilhousen et al. with Sousa et al. to produce the claimed invention.

In view of the above, appellants respectfully request favorable consideration of the appeal from Final Rejection in the above referenced application and its reversal.

Respectfully submitted,

Robert N. Rountree
Attorney for Appellant
Reg. No. 39,347

Texas Instruments Incorporated
P. O. Box 655474, M/S 3999
(972) 917-4431
Fax (972) 917-4418

9. APPENDIX

CLAIMS ON APPEAL

1. A circuit, comprising:

a measurement circuit coupled to receive a first input signal from a first antenna of a transmitter and coupled to receive a second input signal from a second antenna of the transmitter, each of the first and second input signals being transmitted at a first time, the measurement circuit producing an output signal corresponding to a magnitude of the first and second input signals; and

a control circuit coupled to receive the output signal and a reference signal, the control circuit arranged to produce a control signal at a second time in response to a comparison of the output signal and the reference signal.

2. A circuit as in claim 1, wherein each of the first and second input signals comprise at least one pilot symbol.

3. A circuit as in claim 2, wherein each of the first and second input signals is a wideband code division multiple access signal.

4. A circuit as in claim 3, wherein the output signal comprises a sum of the magnitude of each of the first and second input signals and wherein each of the control signal comprises at least one transmit power control signal.

5. A circuit as in claim 3, wherein the output signal comprises a first output signal and a second output signal, the first output signal corresponding to a magnitude of the first input signal and the second output signal corresponding to a magnitude of the second input signal and wherein the control signal comprises at least one transmit power control signal.

6. A circuit as in claim 5, wherein the at least one transmit power control signal comprises a first and a second transmit power control signal, each of the first and second transmit power control signals set to control transmit power of respective said first and second antennas.

7. A circuit as in claim 1, further comprising an estimate circuit coupled to receive at least a first predetermined signal and a second predetermined signal from the transmitter source, each of the first and second predetermined signals having respective predetermined values, the estimate circuit producing the first estimate signal and the second estimate signal in response to the first and second predetermined signals.

8. A circuit as in claim 7, wherein each of the first and second predetermined signals are pilot symbols.

9. A circuit as in claim 8, wherein the measurement circuit, the control circuit and the estimate circuit are formed on a single integrated circuit.

10. A circuit as in claim 8, wherein each of the first and second estimate signals is a Rayleigh fading parameter estimate.

11. A circuit as in claim 8, wherein a total path diversity of each of the first and second symbol estimates is at least twice a number of transmitting antennas.

12. A circuit as in claim 1, wherein the measurement is further coupled to receive a third input signal from a third antenna of the transmitter and coupled to receive a fourth input signal from a fourth antenna of the transmitter, each of the third and fourth input signals being transmitted at the first time, and wherein the output signal further corresponds to a magnitude of the third and fourth input signals.

13. A circuit as in claim 12, wherein each of the input signals comprise at least one pilot symbol.

14. A circuit as in claim 12, wherein each of the input signals is a wideband code division multiple access signal.

15. A circuit as in claim 12, wherein the output signal corresponds to a sum of magnitudes of the input signals.

16. A circuit as in claim 12, wherein the control signal comprises at least one transmit power control signal.

17. A circuit, comprising:

a measurement circuit coupled to receive a first input signal from a first antenna of a transmitter at a first time and coupled to receive a second input signal from a second antenna of the transmitter at a third time, the measurement circuit producing a first output signal corresponding to a magnitude of the first input signal and producing a second output signal corresponding to a magnitude of the second input signal; and

a control circuit coupled to receive the first and second output signals and a reference signal, the control circuit arranged to produce a first control signal at a second time after the first time in response to a comparison of the first output signal and the reference signal, the control circuit arranged to produce a second control signal at a fourth time after the third time in response to a comparison of the second output signal and the reference signal.

18. A circuit as in claim 17, wherein each of the first and second input signals comprise at least one pilot symbol.

19. A circuit as in claim 17, wherein each of the first and second control signals comprise at least one transmit power control signal.

20. A circuit as in claim 17, wherein each of the first and second input signals is a wideband code division multiple access signal.

~~21~~. A circuit as in claim 17, further comprising an estimate circuit coupled to receive at least a first predetermined signal and a second predetermined signal from the transmitter source, each of

the first and second predetermined signals having respective predetermined values, the estimate circuit producing the first estimate signal and the second estimate signal in response to the first and second predetermined signals.

22. A method of processing signals for a communication system, comprising the steps of:

receiving a plurality of input signals being transmitted at a first time, the plurality of input signals corresponding to a respective plurality of antennas;

measuring each input signal of the plurality of input signals and producing at least one output signal;

comparing the at least one output signal to a reference signal;

producing at least one control signal in response to the step of comparing; and

transmitting the at least one control signal at a second time.

23. A method of processing signals as in claim 22, further comprising the steps of:

receiving a plurality of predetermined signals from the plurality of antennas; and

producing a channel estimate in response to the plurality of predetermined signals.

24. A method of processing signals as in claim 23, wherein the at least one control signal comprises at least one transmit power control signal and wherein the plurality of predetermined signals comprise pilot symbol signals.

25. A method of processing signals for a communication system, comprising the steps of:

receiving at least one control signal transmitted from an external source at a first time;

producing a transmit power level of each of a plurality of antennas in response to the control signal;

transmitting a plurality of signals to the external source at a respective said transmit power level at a second time from a respective said plurality of antennas.

26. A method of processing signals as in claim 25, wherein the at least one control signal comprises at least one transmit power control signal.

27. A method of processing signals as in claim 26, wherein the respective said transmit power level has a same transmit power adjustment for each of said plurality of antennas in response to one transmit power control signal.

28. A method of processing signals as in claim 26, wherein the at least one transmit power control signal includes a plurality of transmit power control signals, and wherein the respective said transmit power level for each of said plurality of antennas is set by a respective transmit power control signal of the plurality of transmit power control signal.

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